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10/827,418	04/20/2004	Katsumi Mori	2635-213	2583

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EXAMINER	
STIMPERT, PHILIP EARL	
ART UNIT	PAPER NUMBER
3746	
MAIL DATE	DELIVERY MODE
12/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/827,418	MORI, KATSUMI	
	Examiner	Art Unit	
	Philip Stimpert	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 17 is objected to because of the following informalities: the last line refers to a singular "plunger." All previous references in the claim refer to plural "plungers." For the purposes of this office action, this claim will be interpreted to refer to plural plungers throughout. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-6, 8, 11, 13, 15, and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Suzuki et al (US 2003/0108443).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

4. Regarding claim 1, Suzuki et al teach a rotation-to-linear motion transforming apparatus comprising:

- an eccentric cam (21) coupled to a torque input shaft (15), the cam being rotated eccentrically with respect to the torque input shaft
- a cam ring (80) whose inner wall is placed in contact with the eccentric cam (21) such that the cam ring (80) is urged to rotate by the eccentric cam (21), the cam ring having a flat surface (see Fig. 6B) formed on an outer periphery
- a plunger (20) placed to be movable linearly in a direction perpendicular (see Fig. 2) to the axis of rotation of the eccentric cam (21), the plunger (20) having a flat surface which is pressed against said cam ring (80) in slidable abutment with the flat surface of said cam ring (80) so as to prevent the cam ring from rotating and thereby cause the cam ring (80) to move the plunger (20) linearly
- a safeguard (71) provided in said cam ring which is responsive to application of a physical load greater than a given degree in a direction of rotation of said eccentric cam to undergo breakage

The examiner notes that the grooves (71) of Suzuki et al are not explicitly intended as safeguards. However, the grooves would fulfill the function specified, as they would form the basis for cracks within the cam ring upon the application of sufficient force, causing breakage in the cam ring.

5. Regarding claim 2, Suzuki et al teach that the safeguard (71) is provided in a portion of the cam ring (80) which is out of abutment with the plunger (20) and to which

a tensile stress is added when resistance to sliding motion of the cam ring (80) relative to the plunger (20) increases.

6. Regarding claim 3, Suzuki et al teach that the safeguard (71) is implemented by a groove (see paragraph 89, lines 1-3) formed in the outer periphery of the cam ring (80).

7. Regarding claim 4, Suzuki et al teach a fuel injection pump (title) for an engine (paragraph 3) having a housing (10) having formed therein a cam chamber (40) into which fuel is supplied (paragraph 65, lines 4-5). Suzuki et al further teach that the eccentric cam (21) is disposed within the cam chamber (40) of the housing in mechanical connection with a torque input shaft (15) into which torque outputted by an engine is inputted, the eccentric cam (21) being rotated eccentrically with respect to the torque input shaft. Suzuki et al substantially teach the remaining limitations of the fuel pump as discussed in the rejection of claim 1 over Suzuki et al above.

8. Regarding claim 5, Suzuki et al teach that the safeguard (71) is provided in a portion of the cam ring (80) which is out of abutment with the plunger (20) and to which a tensile stress is added when resistance to sliding motion of the cam ring (80) relative to the plunger (20) increases.

9. Regarding claim 6, Suzuki et al teach that the safeguard (71) is implemented by a groove (see paragraph 89, lines 1-3) formed in the outer periphery of the cam ring (80).

10. Regarding claims 8 and 11, Suzuki et al. teach that the groove (71) is V-shaped in cross-section (see Fig. 6A).

11. Regarding claim 13, Suzuki et al teach a rotation-to-linear motion transforming apparatus comprising:

- an eccentric cam (21) coupled to a torque input shaft (15), the cam being rotated eccentrically with respect to the torque input shaft
- a cam ring (80) whose inner wall is placed in contact with the eccentric cam (21) such that the cam ring (80) is urged to rotate by the eccentric cam (21), the cam ring having opposed flat surfaces (see Fig. 6B) formed on its outer periphery
- plungers (20) placed to be movable linearly in a direction perpendicular (see Fig. 2) to the axis of rotation of the eccentric cam (21), the plungers (20) having a flat surface which is pressed against said cam ring (80) in slidable abutment with one of the flat surfaces of the cam ring (80) so as to prevent the cam ring from rotating and thereby cause the cam ring (80) to move the plungers (20) linearly
- first and second grooves (71) formed in side surfaces of the cam ring which are opposed to each other across the eccentric cam, the first and second grooves tapering in a direction (horizontal in Fig. 6B) substantially perpendicular to the direction (vertical in Fig. 6B) in which the plungers are movable linearly and being offset from each other in the direction in which said plungers are movable linearly.

It is inherent in their structure that each groove is responsive to the application of a physical load greater than a given degree in a direction of rotation of the eccentric cam, and the responsiveness would take the form of breakage.

12. Regarding claim 15, Suzuki et al. teach that the groove (71) is V-shaped in cross-section (see Fig. 6A).

13. Regarding claim 17, the side surfaces in which the grooves are formed are out of abutment with the plungers and a tensile stress would be added when resistance to the sliding of the cam ring relative to the plungers increases.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. Claims 1-3, 7-9, and 13-17 are rejected under 35 U.S.C. 103(a) as being obvious over Mori (US 2001/0015200) in view of Iwasaki et al (US 5,873,784), further in view of Bouchanveau et al (US 5,850,817).

16. Regarding claim 1, Mori teaches a rotation-to-linear motion transforming apparatus used in a fuel pump, comprising:

- an eccentric cam (21) coupled to a torque input shaft (70), the cam (21) being rotated eccentrically with respect to the torque input shaft (70)
- a cam ring (18) whose inner wall is placed in contact with the eccentric cam (21) such that the cam ring (18) is urged to rotate by the eccentric cam (21), the cam ring having a flat surface (see Fig. 2) formed on an outer periphery
- a plunger (30) placed to be movable linearly in a direction perpendicular (see Fig. 2) to the axis of rotation of the eccentric cam (21), the plunger (30) having a flat surface which is pressed against said cam ring in slidable abutment with the flat

surface of the cam ring (18) so as to prevent the cam ring from rotating and thereby cause the cam ring (18) to move the plunger (30) linearly

Mori does not teach a safeguard provided in the ring which is responsive to application of a physical load to undergo breakage. Iwasaki et al teach the use of a mechanical safety breaker which fractures along notches when excessive force or torque is applied (col. 8, lines 8-26). Iwasaki et al also teach that the use of a "mechanical safety breaker adapted to operate normally to transmit a force or torque therethrough but to get broken when the magnitude of the force or torque increases beyond a predetermined limit value so as thereby to cease the transmission of the force of torque for the safety purpose is known and used in various mechanical devices" (col. 1, ln. 14-19). Furthermore, Bouchanveau et al teach the use of "a reduced diameter region 28 such that should the fuel pump 10 seize, the reduced diameter region 28 will shear thus restricting damage resulting from the seizure of the fuel pump 10" (col. 1, ln. 58-61). Therefore, it would have been obvious to one of ordinary skill in the art to modify the cam ring (18) of Mori to provide a safeguard in the ring that causes breakage when the ring is subjected to load greater than a given degree for the purpose of minimizing damage to the structure or apparatus housing the rotation-to-linear motion transforming apparatus.

17. Regarding claim 2, according to the combined references, it would have been obvious to provide the safeguard (in the form of a notch) in a portion of the cam ring which is out of abutment with the plunger so as to avoid unnecessary abrasive wear on the plunger from the edges of the notch. Further, it would have been obvious to provide

the safeguard in a location where a tensile stress is added when resistance to sliding motion between the cam ring and the plunger increases, since this would have ensured failure in the case of the most likely mode of seizure in the rotation-to-linear motion transforming apparatus of Mori.

18. Regarding claim 3, Iwasaki et al teach the use of a groove as a safeguard. It would have been obvious to one of ordinary skill in the art to provide the groove in an outer or inner surface of the cam ring so as to promote proper crack propagation in the case of excessive force.

19. Regarding claim 7, the groove as taught by Iwasaki extends from one side to an opposite side. In the combination, that would translate to a groove extending from one end to an axially opposite end of the cam ring.

20. Regarding claim 8, the groove as taught by Iwasaki et al. is V-shaped in cross-section.

21. Regarding claim 9, the groove as taught by Iwasaki et al. does not communicate through the member in which it is formed.

22. Regarding claim 13, Mori teaches a rotation-to-linear motion transforming apparatus used in a fuel pump, comprising an eccentric cam (21) coupled to a torque input shaft (70), the cam (21) being rotated eccentrically with respect to the torque input shaft (70), a cam ring (18) whose inner wall is placed in contact with the eccentric cam (21) such that the cam ring (18) is urged to rotate by the eccentric cam (21), the cam ring having flat surfaces (see Fig. 2) formed on an outer periphery, and plungers (30) placed to be movable linearly in a direction perpendicular (see Fig. 2) to the axis of

rotation of the eccentric cam (21), the plungers (30) each having a flat surface which is pressed against the cam ring in slidable abutment with the flat surface of the cam ring (18) so as to prevent the cam ring from rotating and move the plunger (30) linearly. The grooves as taught by Iwasaki et al. are formed on opposite sides of the member in which they are formed. Further, as the grooves taught by Iwasaki et al. are V-shaped in cross-section, they taper inward. Formed on the side surfaces of the cam (21) of Mori, they would taper in a horizontal direction substantially perpendicular to the vertical reciprocation of the plungers. Further, one of ordinary skill in the art, when providing safeguards as taught by Iwasaki in the cam (21) of Mori, would know to provide such grooves in respective locations in which they would receive the tensile stress necessary to cause failure. As the cam (21) is receiving rotary forces from the shaft (70), those locations would be offset in the vertical direction of the plungers reciprocation.

23. Regarding claim 14, the grooves as taught by Iwasaki et al. extend from one side to an opposite side. In the combination, that would translate to a groove extending from one end to an axially opposite end of the cam ring.

24. Regarding claim 15, the grooves as taught by Iwasaki et al. are V-shaped in cross section.

25. Regarding claim 16, the grooves as taught by Iwasaki et al. do not communicate through the member in which they are formed.

26. Regarding claim 17, it would have been obvious to provide the safeguard (in the form of a notch) in a portion of the cam ring which is out of abutment with the plunger so as to avoid unnecessary abrasive wear on the plunger from the edges of the notch.

Further, it would have been obvious to provide the safeguard in a location where a tensile stress is added when resistance to sliding motion between the cam ring and the plunger increases, since this would have ensured failure in the case of the most likely mode of seizure in the rotation-to-linear motion transforming apparatus of Mori.

27. Claims 4-6 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori in view of Iwasaki et al (US 5,873,784) and Bouchanveau et al (US 5,850,817) as applied to claims 1-3 above, further in view of applicant's admission of prior art.

Regarding claim 4, the previously combined references teach a fuel injection pump (Mori, title) for an engine (Mori, paragraph 3) having a housing (Mori, 11) having formed therein a cam chamber (Mori, see Fig. 1). The previously combined references also teach that the eccentric cam (Mori, 21) is in mechanical connection with a torque input shaft (Mori, 20) into which torque outputted by an engine is inputted, the eccentric cam (Mori, 21) being rotated eccentrically with respect to the torque input shaft. Further, the previously combined references teach a plunger (Mori, 30) placed to be movable in a direction perpendicular to an axis of rotation of the eccentric cam (Mori, 21), with the plunger having a flat surface pressed against the cam ring (Mori, 18) in slidable abutment with the flat surface of the cam ring (Mori, 18) so as to hold the cam ring (Mori, 18) from rotating, thereby urging the plunger to reciprocate to increase and decrease a volume of a fuel pressurizing chamber (Mori, 50) cyclically. The previously combined references also teach the remainder of the details of the eccentric cam, cam

ring, and safeguard as discussed in the above rejection of claims 1-3 over the previously combined references. However, the previously combined references do not teach that fuel is supplied to the cam chambers. On page 2, lines 9-13 of the specification of the instant application, the applicant states, "a cam chamber is defined between the cam ring J4 and the housing and filled with fuel which serves to lubricate a contact surface between the cam ring J4 and the plunger J6." This constitutes an admission by the applicant of prior art. It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the injection fuel pump of Mori to provide fuel to the cam chamber in order to lubricate the slidably abutting surfaces of the plunger and the cam ring.

28. Regarding claim 5, according to the combined references, it would have been obvious to provide the safeguard (in the form of a notch) in a portion of the cam ring which is out of abutment with the plunger so as to avoid unnecessary abrasive wear on the plunger from the edges of the notch. Further, it would have been obvious to provide the safeguard in a location where a tensile stress is added when resistance to sliding motion between the cam ring and the plunger increases, since this would have been the most likely mode of seizure in the injection fuel pump of Mori, as indicated by Beauchanveau et al.

29. Regarding claim 6, Iwasaki et al teach the use of a groove as a safeguard. It would have been obvious to one of ordinary skill in the art to provide the groove in an outer or inner surface of the cam ring so as to promote proper crack propagation in the case of excessive force.

30. Regarding claim 10, the groove as taught by Iwasaki extends from one side to an opposite side. In the combination, that would translate to a groove extending from one end to an axially opposite end of the cam ring.

31. Regarding claim 11, the groove as taught by Iwasaki is V-shaped in cross-section.

32. Regarding claim 12, the groove as taught by Iwasaki does not communicate through the member in which it is formed.

Response to Arguments

33. Applicant's arguments, see pg. 6, ln. 4-8, filed 13 September, 2007, with respect to the informalities objection to claim 1 have been fully considered and are persuasive. The objection to claim 1 has been withdrawn.

34. Applicant's further arguments filed 13 September, 2007 have been fully considered but they are not persuasive.

35. In response to applicant's argument that the grooves (71) or Suzuki are not intended as safeguards, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In this

case, as indicated in pg. 4, ln. 7-10 of the previous office action dated 7 June, 2007, the grooves would form the basis for cracks upon application of sufficient force. Therefore they would inherently fulfill the same function as the applicant's safeguards.

36. Applicant's arguments regarding the rejection of claims 1-6 under 35 U.S.C. 103(a) are not persuasive. As cited, Bouchanveau et al. teach that provision of a failure member may prevent damage in a fuel pump such as that taught by Mori in the case of seizure of the pump. One of ordinary skill in the art would appreciate that the particular method and apparatus for damage prevention taught by Bouchanveau et al. is not the solitary solution for the problem. Iwasaki et al., as cited, indicate that provision of safety breakers is known in a various devices. Thus, it is indicated that the particular structure they teach for such is broadly applicable, and not limited solely to power steering systems. Taking the foregoing into consideration, the rejection of claims 1-6 under 35 U.S.C. 103(a) is maintained.

37. Applicant's statements on pg. 9, ln. 19-20, regarding the examiner's previous assertion of admitted prior art, it appears that the applicant is in agreement that the limitation of a cam chamber filled with fuel is, in fact, prior art. In the previous action, this prior art was not used to suggest a modification of Mori so as to provide safeguards, but rather, to provide a cam chamber filled with fuel. As such, applicant's remarks on this matter do not materially affect the examiner's position with regards to any existing rejection.

Conclusion

38. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

39. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip Stimpert whose telephone number is (571) 270-1890. The examiner can normally be reached on Mon-Fri 8:00AM-5:00PM, Alt. Fridays, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571) 272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PES
20 Dec 07

DEVON C. KRAMER
PATENT EXAMINER
12/21/07